CLAIM AMENDMENTS

Please amend claims 1, 2, 6, 7, 9, 11, 12, 13, 23 and cancel claim 21 and enter new claims 25, 26, 27 as follows:

1. (Currently Amended) A~~ ~~An electromechanical method for modifying at least one synapse of an artificial physical neural network, said method comprising the steps of:

providing an artificial physical neural network comprising at least one neuron and at least one synapse thereof, wherein said at least one synapse is provided by a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof, wherein said dielectric liquid solution comprises a mixture of a dielectric solvent and said plurality of nanoconductors;

locating said dielectric liquid solution within a connection gap formed between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said at least one synapse of said artificial physical neural network becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are

utilized more frequently by said artificial physical neural network are strengthened; and

transmitting at least one pulse generated from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening ~~at least one nanoconnection of~~ said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one synapse thereof.

2. (Currently Amended) ~~The method of claim 1 further comprising the step of:~~

~~increasing said electrical frequency of said electric field applied to said at least one pre-synaptic electrode and said at least one post-synaptic electrode, in response to generating said at least one pulse from said at least one neuron, thereby strengthening at least one nanoconnection of said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one synapse thereof~~

configuring said at least one neuron to comprise a refractory pulse generator that provides a feedback signal to said at least one post-synaptic electrode in order to strengthen and/or weaken a conductance associated with said plurality of nanoconnections.

3. (Previously Amended) The method of claim 1 further comprising the step of:

forming a connection network within said connection gap from said plurality of nanoconnections by applying said electric field across said connection gap to said at least one pre-synaptic electrode and said at least one post-synaptic electrode associated with said plurality of nanoconnections.

4. (Previously Cancelled)

5. (Previously Cancelled)

6. (Currently Amended) A An electromechanical method for strengthening nanoconnections of an artificial physical neural network, said method comprising the steps of:

providing an artificial physical neural network comprising a plurality of neurons formed from a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors disposed and free to move about within said dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode;

locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened; and

activating a subsequent neuron in response to firing an initial neuron of said plurality of neurons, thereby increasing a voltage of a pre-synaptic electrode of said neuron, which causes a refractory pulse thereof to decrease a voltage of a post-

synaptic electrode associated with said neuron and thus provides an increased voltage between said pre-synaptic electrode of said preceding neurons and said post-synaptic electrode of said neuron.

7. (Currently Amended) The method of claim 6 further comprising the steps of:

firing and activating subsequent neurons thereof in succession in order to produce an increased frequency of said electric field between subsequent pre-synaptic and post-synaptic electrodes thereof, thereby causing an increase in an alignment of at least one nanoconnection of said plurality of nanoconnections and a decrease in an electrode resistance between said subsequent pre-synaptic and post-synaptic electrodes thereof.

8. (Previously Cancelled)

9. (Currently Amended) A An electromechanical method for forming an adaptive artificial physical neural network utilizing nanotechnology, said method comprising the steps of:

configuring an adaptive artificial physical neural network to comprise a connection network comprising a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors located and free to move about within said a dielectric liquid solution, wherein said plurality of nanoconductors experiences an alignment with respect to an applied electric field to form said a connection network thereof, such that said adaptive physical neural network comprises a plurality of neurons interconnected by said a plurality of said nanoconnections;

locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic

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electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened;

providing an increased frequency of said applied electric field to strengthen said plurality of nanoconnections within said adaptive physical neural network regardless of a network topology thereof.

10. (Original) The method of claim 9 further comprising the step of:

providing at least one output from at least one neuron of said plurality of neurons to an input of another neuron of said adaptive physical neural network.

11. (Currently Amended) The method of claim 9 further comprising the steps of:

automatically summing at least one signal provided by said connection network via at least one neuron of said adaptive physical neural network to provide a summation value thereof; and

comparing said summation value to a threshold value and emitting a refractory pulse if a current activation state exceeds said threshold value; and

automatically grounding or lowering to -Vcc a post synaptic junction associated with said at least one neuron during emission of said pulse, thereby

causing at least one synapse in receipt of a pre-synaptic activation to experience an increase in a local electric field, such that at least one synapse that contributes to an activation of said at least one neuron experiences an increase in said local electric field parallel to a connection direction associated with said connection network and additionally experiences a higher frequency of activation in order to increase a strength of said plurality of nanoconnections.

12. (Currently Amended) The method of claim 9 further comprising the steps of: wherein at least one neuron of said artificial physical neural network comprises an integrator

automatically summing at least one signal provided by said connection network via at least one neuron of said adaptive physical neural network to provide a summation value thereof; and

comparing said summation value to a threshold value and emitting a refractory pulse if a current activation state exceeds said threshold value.

13. (Currently Amended) A An electromechanical method for training an artificial physical neural network formed utilizing nanotechnology, said method comprising the steps of:

providing an artificial a physical neural network comprising a plurality of neurons connected via a connection network comprising a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of plurality of nanoconductors and a dielectric solvent, wherein said plurality of nanoconductors is disposed and free to move about within said dielectric liquid solution to form said connection network, wherein said plurality of nanoconnections transfers signals;

locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened;

presenting an input data set to said artificial physical neural network to produce at least one output thereof; and

increasing network activity within said artificial physical neural network until said at least one output changes to a desired output.

14. (Previously Amended) The method of claim 13 wherein the step of increasing said network activity within said artificial physical neural network, further comprises the step of:

increasing a number of firing neurons in said artificial physical neural network.

15. (Previously Amended) The method of claim 13 wherein:

said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by said nanoconnections among said plurality of

nanoconnections, each of said nanoconnections among said plurality of nanoconnections being associated with a weight; and

said increasing said network activity within said physical neural network includes scaling a weight associated with said nanoconnections by a positive factor.

16. (Previously Amended) The method of claim 13 wherein:

said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by nanoconnections among said plurality of nanoconnections for transferring signals having a magnitude in a firing state; and

said increasing said network activity within said artificial physical neural network includes increasing said magnitude of said signal in said firing state.

17. (Previously Amended) The method of claim 13, wherein:

said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by a plurality of data input neurons thereof adapted to receive respective external signals;

said increasing said network activity within said artificial physical neural network includes increasing a magnitude of said respective external signals.

18. (Previously Amended) The method of claim 13, wherein:

said plurality of neurons comprises a plurality of interconnected neurons, each of said interconnected neurons being configured to fire when a corresponding excitation level thereof is greater than or equal to a threshold; and

said increasing said network activity within said artificial physical neural network includes lowering said threshold.

19. (Previously Amended) The method of claim 18 further comprising the step of:

determining said excitation level of at least one neuron of said plurality of neurons based on a weighted sum of input signals received over respective nanoconnections among said plurality of nanoconnections, said nanoconnections being associated with respective weights; and

adjusting each of said weights when said at least one neuron of said plurality of neurons and a corresponding one of said others of said neurons fire within a prescribed time interval.

20. (Previously Amended) The method of claim 13 further comprising the step of:

increasing said network activity within said artificial physical neural network in response to a signal.

21. (Cancelled)

22. (Previously Cancelled)

23. (Currently Amended) An adaptive artificial physical neural network, comprising:

a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors;

at least one neuron and at least one electromechanical synapse thereof, wherein said at least one electromechanical synapse is configured from a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within said dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof;

a connection gap formed between said between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein said liquid dielectric solution is located within said connection gap, wherein each

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nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said adaptive artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened; and

pulse generation means for generating at least one pulse from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening at least one nanoconnection among said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one electromechanical synapse thereof.

24. (Previously Submitted) The adaptive artificial neural network of claim 23 further comprising a connection network formed from said plurality of nanoconnections by applying said electric field to said at least one pre-synaptic electrode and said at least one post-synaptic electrode associated with said plurality of nanoconnections.

25. (New) The adaptive artificial neural network of claim 23 wherein said pulse generation means comprises a refractory pulse generator for generating said at least one pulse.

26. (New) The adaptive artificial neural network of claim 23 wherein said at least one pulse comprises a refractory pulse.

27. (New) The adaptive artificial neural network of claim 23 further comprising:

a connection network formed from said plurality of nanoconnections by applying said electric field to said at least one pre-synaptic electrode and said at least one post-synaptic electrode associated with said plurality of nanoconnections, wherein said pulse generation means comprises a refractory pulse generator for generating said at least one pulse and wherein said at least one pulse comprises a refractory pulse.